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THE GENUS *XIPHOGRAMMA*, ITS OCCURRENCE IN NORTH AMERICA, AND REMARKS ON CLOSELY RELATED GENERA (HYMENOPTERA: TRICHOGRAMMATIDAE)

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Abstract.—The genus *Xiphogramma* is briefly reviewed and compared to related genera, *Chaetogramma* and *Brachygrammatella*. ***Xiphogramma fuscum*** n. sp., the first species from the New World, is described from southwestern North America. A key to the species of *Xiphogramma* and a description of the male genitalia are included.

Key Words: Hymenoptera, Trichogrammatidae, *Xiphogramma* taxonomy

The genus *Xiphogramma* Nowicki, with three species included, has been known only from the Old World (Doutt 1974, Hayat 1980). This paper describes a fourth species, from North America, and includes a key to the known fauna. The characters of the new species indicate the artificiality of *Chaetogramma* Doutt, as defined by Hayat (1981). Arguments for and against synonymy of these genera are presented.

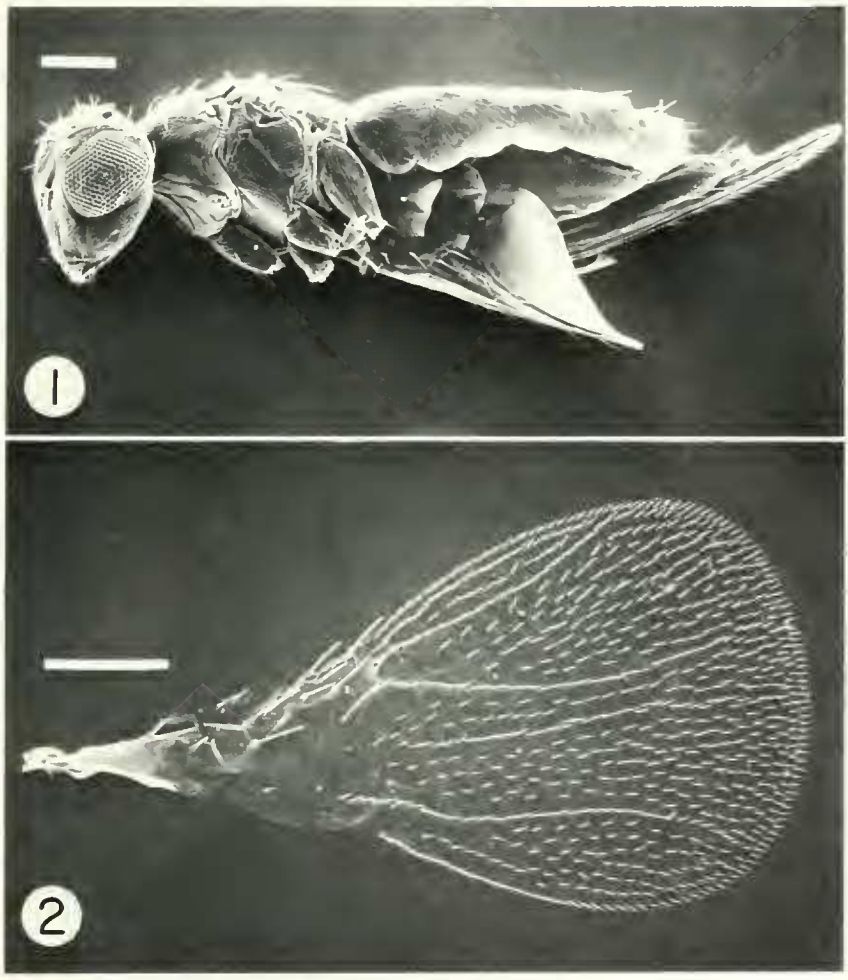
Hosts of *Xiphogramma* are unknown. The species described here emerged from grape leaves containing eggs of both Cicadellidae and Miridae. Of its related genera, *Chaetogramma* and *Brachygrammatella* Girault, hosts of only the latter are known. Species of *Brachygrammatella* have been associated with eggs of Cicadellidae, Membracidae and Miridae (Doutt 1968, Viggiani 1968, Yousuf & Shafee 1987).

Xiphogramma

Xiphogramma was described by Nowicki (1940) for the unique European trichogrammatid, *X. holorhoptra* Nowicki. He afforded the species generic status on the basis of ovipositor structure—"abdomen with a powerful ovipositor occupying its entire length and protruded for more than a half of abdomen's length: the valvae are much broadened before the tip, curved upwards and sabre-like." All *Xiphogramma* species have an exserted, curved ovipositor, but it is not necessarily as long as in *X. holorhoptra*.

Other features of the genus include antenna with two anelli, two subequal, closely-appressed funicle segments, one-segmented club, club not widest at base; maxillary palp one-segmented; vertex wrinkled, vaulted; wing disk densely setate, vein tracks, if present, usually becoming obsolescent apically; stigmal vein broad, subsessile, marginal vein not densely setate; a dark macula of varying size and intensity beneath venation; tarsal segment I of middle leg elongate, distinctly longer than that of hind leg.

An African species, *X. anneckei*, was added by Doutt (1974), and *X. indicum*, from India, was described by Hayat (1980). The new species described below occurs in arid and semiarid regions of southwestern North America. Males and females have been collected. Heretofore, the only male of *Xiphogramma* known was the allotype of *X. anneckei*.



Figs. 1, 2. *Xiphogramma fuscum*, female. 1, Lateral view (appendages removed). 2, Forewing. Scale bar = 0.1 mm.

Xiphogramma fuscum, New Species

The description is based on critical point dried (for color and body length measurements) and slide mounted specimens. Quantitative data represent means taken from three specimens from the type locality; the mean is followed by a range, in parentheses, if variation is considerable. Significant intraspecific variation among locales was not detected.

Female (Fig. 1).—Body length 1.08 mm; 0.95 mm excluding exserted ovipositor.

Color: Primarily dark brown except as follows: head with linear yellow area along medial rim of eye; frons yellow brown; face yellow brown to dark brown. Antenna with scape primarily pale yellow, margined with brown; pedicel light brown; funicle yellow brown; club pale brown or yellow brown. Thorax with narrow linear yellow marking at midline of pronotum and immediately lateral to mid-lobe of mesoscutum; mesepimeron, mesepisternum with at least some yellow; metanotum, propodeum, segment I of gaster yellow except laterally. Legs brown except apex of coxae, trochanters, base and

apex of femora and tibiae, and tarsi whitish (apical tarsal segment may be pale brown). Venation of fore wing bicolored; stigmal vein, apical half of marginal vein pale brown; remainder of venation pale yellow. Wings hyaline except a small fumate area beneath stigmal vein.

Head: Length and width subequal; vertex vaulted, arched above eyes, wrinkled; scrobes relatively deep; lower margin of torulus coincident with ventral margin of eye; malar space ca. 0.6 eye length. Mandible with four teeth.

Antenna (Fig. 3) with second anellus very short, inconspicuous, closely appressed to funicle; F1, F2 subequal in length; length/width of segments as follows: scape—3.42, pedicel—2.07, F1—0.62 (0.58–0.67), F2—0.74 (0.71–0.78), club—2.29 (2.2–2.4); antenna moderately setate, setae longer, stouter on pedicel and funicle; F1 with 1 transverse placoid sensillum, distal portion of sensillum curved toward apex of segment; F2 with 3 oblique placoids; F1, F2 each with several basiconic peg sensilla on apical margin; club with 12 linear placoids, club also with many thin-walled setiform sensilla at apical half and several basiconic peg sensilla near middle.

Thorax: Forewing (Fig. 2) broad, suboblate apically, 0.55 as broad as long, with a very short fringe; venation attaining 0.43 length of wing; setation on disc apical to venation dense; vein tracks becoming obsolescent apically; RS_1 represented by 2–3 setae, 2 setae in line with RS_1 on apex of stigmal vein; basal vein track with 2 setae; costal cell, narrow, with setae along apical half of anterior margin; relative length of veins as follows: subcostal—29, premarginal—14, marginal—15, stigmal—6; marginal vein stout, slightly, gradually widened apically with about 8 setae; stigmal vein poorly defined, stout, subsessile, ca. as long as broad; premarginal vein with 2 setae; subcosta with 1 seta at middle. Hindwing moderately broad, maximum width of disk 1.4× length of longest posterior fringe setae; with 2 distinct setal tracks just behind anterior margin, remainder of disk with many scattered setae.

Thoracic setae elongate, stout; mid-lobe of mesoscutum with 4 setae of subequal length; scutellum with posterior pair of setae ca. 1.5× as long as anterior pair; lateral lobe of mesoscutum, axilla each with 1 elongate seta.

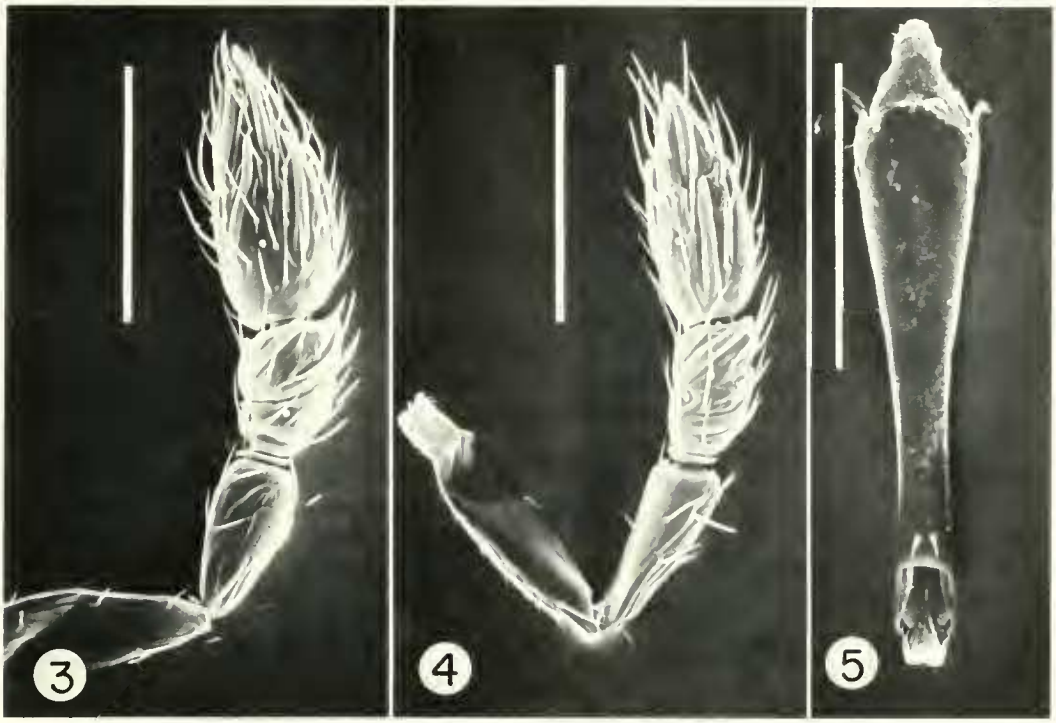
Foretibia with 5 "teeth" on anterior surface, basal 2 weaker than apical ones. Fore and middle femora with a relatively elongate seta ventroapically. Hind femur distinctly broader than others; hind trochanter swollen dorsally. Tibial spurs not plumose. Relative length of coxae, trochanters, femora, tibiae, and (tarsi) as follows: fore leg—26:11:41:32:(9:11:11); middle leg—21:14:40:49:(19:14:13); hind leg—35:17:40:48:(13:13:13); length of apical tibial spines 4, 7, 8, resp.; length of apical setae on fore and middle femora 8, 11, resp.

Gaster (Fig. 1): Gaster (excluding ovipositor) elongate, apically acuminate, ca. 1.5× as long as thorax; hypogynium attaining 0.8 length of gaster. Ovipositor elongate, running along entire length of gaster and beyond, broadly curved dorsally, its length 2.6–3.1 length of mid and hind tibiae; gonoplac elongate, densely setate, comprising 0.36 length of entire ovipositor, almost its entire length extending beyond apex of gaster; gonangulum small, subtriangular, basal 0.10 of ovipositor extending anterior of gonangulae.

Male.—As in female except as follows:

Head (in 3 of 6 dried specimens) paler with vertex yellow lateral and dorsal to scrobes. Antenna (Fig. 4) with pedicel, F1 more elongate; with only 1 placoid sensillum on F2, 5 placoids on club; club segments incompletely fused, an obsolescent U-shaped suture on anterior surface between basal and apical placoids; length/width of segments as follows: scape—3.50, pedicel—2.41, F1—1.07, F2—0.75, club—2.19.

Genitalia (Fig. 5) very similar to that described for *Chaetogramma maculata* (Hayat 1981, Fig. 5); very elongate, narrow,



Figs. 3–5. *Xiphogramma fuscum.* 3, Right female antenna (anterior surface). 4, Right male antenna (same). 5, Male genitalia (ventral). Scale bar = 0.1 mm.

6.7× as long as wide, length subequal to that of hind tibia; aedeagus fused to genital capsule, apodemes absent; base of genital capsule attenuate, its ventral region extending anteriorly; posterior border of anterodorsal aperature not sclerotized, poorly indicated; genital capsule with 2 short, stout spines apicoventrally; volsellae broad, unarmed, apically truncate; gonostyli not differentiated.

Types.—Holotype female; from Mexico, Sonora, Caborca; emerging in laboratory from grape leaves collected 2-VI-1989; L. Drake, collr.; deposited in the United States National Museum. Allotype male; same data as holotype; deposited in the United States National Museum. Additional specimens from Caborca (4 ♀♀, 7 ♂♂) are designated paratypes and deposited as follows: 1 ♀, 1 ♂, British Museum (Natural History); 1 ♀, 1 ♂, Canadian National Collection (Ottawa); 2 ♀♀, 5 ♂♂, University of California (Riverside). The holotype, allotype and 6 of the paratypes (3 ♀♀, 3 ♂♂) are mounted on glass slides in Canada balsam. One ♀ and 4 ♂♂ paratypes are card mounted.

Diagnosis.—*X. fuscum* is similar to *X. indicum.* Characters separating them are presented in the key below. The most similar species in North America is *Chaetogramma occidentalis* Doutt. Ovipositor length (short, not exserted in *C. occidentalis*) separates females. Genital structure will distinguish males. In *X. fuscum,* the aedeagal apodemes are not expressed and the base of the genital capsule is attenuate anteriorly (Fig. 5); in *C. occidentalis* the apodemes are well developed, and the genital capsule is truncate basally (Pinto, unpubl.). Also in *X. fuscum* the two funicle segments are distinct and not partially fused as in *C. occidentalis.*

Etymology.—The specific name is Latin and refers to the dark brown body color.

Host.—The host of *X. fuscum* is unknown. Specimens from Caborca, Sonora, and Tonopah, Arizona, emerged from grape

leaves harboring eggs of leafhoppers and mirid bugs (*Parthenicus*).

Records.—19 ♀♀, 12 ♂♂. MEXICO. *Baja California Sur:* Ciudad Constitucion, 11 km N.; 1 ♀; 27-X-1983; screen sweeping desert vegetation; J. D. Pinto. *Sinaloa:* Mazatlan, 12 mi. N.; 1 ♀; 25-X-1982. *Sonora:* Caborca; 5 ♀♀, 8 ♂♂; emerging from grape leaves coll. 2-VI-1989, 27-VII-1989 & 2-VIII-1989; L. Drake. Hermosillo; 1 ♀, 1 ♂; emerging from grape leaves coll. 2-VI-1989, 9-VII-1989; L. Drake; & 4 ♀♀; 6-X-1985; D. Gonzalez. UNITED STATES. *Arizona:* Stanfield, 1 ♀, emerging from grape leaves coll. 11-VII-1989; L. Drake. Sycamore Canyon, 9 mi. W. Peña Blanca Lk. (Santa Cruz Co.), 4100 ft. elev.; 1 ♀; 12-VII-1983; R. Anderson. Tonopah; 1 ♀, 1 ♂; emerging from grape leaves coll. 21-VI-1989; L. Drake. *California:* Baker, 11 km N.; 1 ♀; 30-III-1989; screen sweeping desert vegetation; J. D. Pinto. Hemet, E of (4000 ft. elev.); 1 ♀; screen sweeping *Adenostoma sparsifolium* Torr.; 30-VI-1983; R. Velten. *Texas:* Ben Bolt, 8 mi. W. (La Copita Res. Sta.); 3 ♀♀, 2 ♂♂; 20-V-1987; screen sweeping; J. B. Woolley.

Key to the Species of *Xiphogramma* (Females)

1. Gaster elongate, its length at least 2× that of thorax; exserted portion of ovipositor greater than half gaster length 2
– Gaster shorter, its length about 1.5× that of thorax, subequal to length of head and thorax combined; exserted portion of ovipositor not greater than half gaster length 3
2. Dorsum of gaster primarily dark brown, weakly marked with yellow at tergal margins only. Marginal vein widened apically. Length of funicle equal to or slightly shorter than pedicel. Europe (Poland) ..... *X. holorhoptra*
– Dorsum of gaster primarily yellow, marked with brown; marginal vein not widened apically. Length of funicle distinctly greater than that of pedicel. Africa (South Africa, Tanzania, Ivory Coast) ..... *X. anneckei*
3. Hypogynium elongate, attaining apex of gaster. Antenna with F1 as long as or longer than wide, longer than F2. India ..... *X. indicum*
– Hypogynium shorter, attaining 0.8 gaster length. Antenna with F1 distinctly wider than long, subequal in length to F2. Southwestern North America ..... *X. fuscum*, n. sp.

Discussion

Xiphogramma is closely related to *Brachygrammatella* and *Chaetogramma*. Wing and antennal structure is similar in all three genera.

Brachygrammatella is distinguished by the densely setate marginal vein, and minor antennal differences (club widest at base, funicles much broader than long); also, the ovipositor in this genus does not project beyond the gaster (see Doutt and Viggiani 1968).

Doutt (1974) described *Chaetogramma* for an African and a North American species, which he separated from *Xiphogramma* primarily by the short ovipositor (not extending beyond gaster), and the fused or partially fused funicle segments. His statement that the number of anelli also separate the two (1 in *Chaetogramma*, 2 in *Xiphogramma*) is incorrect. There are 2 anelli in both, as well as in *Brachygrammatella*.

Hayat (1981) divided *Chaetogramma* into two subgenera, the nominate, which includes both of Doutt's species, and *Chaetogrammina*, erected for *C. maculata* Hayat from India. *Chaetogrammina* was distinguished primarily by its completely divided funicle segments, its more distinct vein tracks and better developed costal cell. Male genitalia, not compared by Hayat, provide another difference. In the nominate subgenus distinct aedeagal apodemes are present (Pinto, unpubl.) as they are in *Brachygrammatella* (Viggiani 1971, Pinto, unpubl.). In *Chaetogrammina*, based on descriptions and figures in Hayat (1981) and Viggiani (1984), they are absent or poorly developed.

Viggiani (1984) pointed out the similarity of male genital structure in *Brachygrammatella* and *C.* (*Chaetogrammina*) and, on this basis, questioned the validity of *Chaetogramma*. The male genitalia in *Xiphogramma* cast further doubt on the validity of *Chaetogramma*. They are virtually identical to that in *C.* (*Chaetogrammina*) *maculata*.

The only character now separating *Xiph-*

ogramma and *Chaetogramma* is ovipositor length. The difference in length between *X. anneckei* and *X. holorhoptra* on the one hand, and species of *Chaetogramma* on the other, although considerable, is bridged substantially by *X. indicum* and *X. fuscum*. For example, in *X. anneckei* the exserted portion of the ovipositor is 0.8–0.9 the length of the gaster, and in *C. maculata* the ovipositor does not extend beyond the gaster. In *X. fuscum*, however, the exserted portion of the ovipositor is never more than 0.45 gaster length. Although synonymy is suggested, I hesitate at present for the following reason. *Chaetogramma*, as currently defined, is paraphyletic. It is distinguished from *Brachygrammatella* and *Xiphogramma* only by primitive traits (e.g. absence of a densely setate marginal vein, and a short ovipositor). Synonymizing it with *Xiphogramma* simply results in a larger paraphyletic unit, more difficult to characterize than either is at present.

Structure of the forewing, antenna and genitalia suggest that *C.* (*Chaetogrammina*) is closer to *Xiphogramma* than to its nominate subgenus. Moving this subgenus to *Xiphogramma* probably is appropriate. The only clearly derived traits currently justifying this are associated with the male genitalia, however. Because the male genitalia are known in only one species of *Xiphogramma*, I consider it premature to transfer *Chaetogrammina* and then define *Xiphogramma* solely on male features.

Acknowledgments

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